Claims

1. A method of measuring amplitude and phase variations in a spatially coherent beam of light comprising

causing the beam to be incident upon a spatial array displaying a pixellated first phase distribution,

in a measuring region of said spatial array, causing the phase distribution to change to a new value while retaining the first phase distribution outside the measuring region,

in the Fourier plane, determining the change in intensity resulting from the change in phase distribution.

2. A method of characterising a spatially coherent beam of light, comprising

disposing a LCOS SLM in the path of the beam;

causing the LCOS SLM to display a first hologram pattern;

at a location in said beam where the amplitude and phase of the beam are to be characterised, changing the hologram pattern to a second hologram pattern; and

measuring the effect of said change by determining an intensity change.

3. A method as claimed in claim 2, wherein. the output from the SLM is detected in the Fourier plane to detect the Fourier output.

4. A method as claimed in any preceding claim, comprising measuring the intensity in a region of the Fourier plane where the amplitude distribution associated with the beam modulated by the original hologram is relatively stronger, but the amplitude distribution at the Fourier plane of the field component created by the perturbation in the hologram is relatively stronger, varying the position on the SLM where the perturbation is applied.

5. A method as claimed in claim 4, further comprising taking the square root of a set of values obtained.

6. A method as claimed in any preceding claim, comprising stepping through a sequence of phase distributions.

7. A method as claimed in any preceding claim, comprising varying the phase shift in a respective single pixel.

8. A method as claimed in claim 3 comprising manipulating hologram patterns to obtain information related to a coherent coupling term to thereby derive amplitude information.

9. A method as claimed in claim 3 comprising manipulating hologram patterns to obtain information related to a coherent coupling term to thereby derive phase information.

10. A method as claimed in any preceding claim wherein the step of detecting is carried out at a single point.

11. A method as claimed in any preceding claim wherein after changing to a new value, the phase distribution in the measuring region returns to its original value.

12. Apparatus for measuring amplitude and phase variations in a spatially coherent beam of light, the apparatus comprising a pixellated spatial array, each pixel being controllable to apply any of plural phase shifts to input light, whereby the array displays a desired distribution of phase modulation,

means for causing the array to display a first selected distribution of phase modulation; means for changing the first distribution in a measuring region of said spatial array to assume a new distribution while retaining the first phase distribution outside the measuring region,

means disposed in the Fourier plane for determining a change in intensity of light resulting from the change in phase distribution.

13. Apparatus as claimed in claim 12, wherein the spatial array has only two possible values of phase shift per pixel.

14. Apparatus as claimed in claim 12, wherein the spatial array has more than two possible values of phase shift per pixel.

15. Apparatus for characterising a spatially coherent beam of light, comprising
a LCOS SLM arranged so that a said beam of light can be incident upon it;
means for causing the LCOS SLM to display a first hologram pattern;
means for changing the hologram pattern to a second hologram pattern at a location in said beam where the amplitude and phase of the beam are to be characterised; and
means for measuring an intensity of light to determine the effect of said change of hologram pattern.

16. Apparatus as claimed in claim 15, wherein the means for measuring is disposed in the Fourier plane to detect the Fourier output.

17. Apparatus as claimed in claim 15 or 16, further comprising a lens for providing the Fourier output.

18. Apparatus as claimed in claim 15, 16 or 17, further comprising a mirror for providing the Fourier output.